404401

Sample No: J 12-ELD-D

Description: Airborne dust from Operation Greenhouse

Submitted by: E. L. Dodds

Date Submitted: August 8, 1951

Analysis Requested: (1) Particle size analysis, (2) Petrographic examination, (3) Spectrographic analysis

Submitted to: Staritzky and Phelps

Results

Sample marked "Collected after Fallout 4/8/51 near 212A." It was thought to be part of the fallout after the "DOG" shot of the Greenhouse operation. It was collected in an Army vehicle located some 18 miles from the shot site.

Microscopic Examination. The sample consisted precominantly of particles of fused glass. Aluminum turnings, chips of paint, grains of sand and dust made up about 20% of the total. The shape of glass particles was predominantly spherical though a substantial number (about 20%) deviated from spherical shape through ellipsoidal and rod-shapes with thickened ends to peculiar dumb-bell shapes. An example of the latter is a particle consisting of two spheres, each 0.63 mm diameter, joined by a rod 0.11 mm diameter and 1.92 mm long. The glass was dark gray in color with refractive index varying little from a mean around 1.64. The density of the glass particles ranged from 2.65 to 2.85 with a few grains as low as 2.47, due to vesicular voids. No evidence of devitrification of flow structures were observed.

Five particles were found in which the above-described globules of glass were intimately associated with some green paint. In one case several globules were embedded in some paint. Numerous scales of similar paint occurred in the sample. These were magnetic, apparently having been scaled off an iron surface. The pigment outwardly resembled zinc chromate.

Sizing Analysis. The maximum size of spherical particles was 1.8 mm diameter. Sizing analysis by screening gave:

> 1.68mm	2% weight
1.19 - 1.68mm	8% weight
0.84 - 1.19mm	14% weight
0.59 - 0.84mm	31% weight
0.42 - 0.59mm	22% weight
0.297 - 0.42mm	10% weight
0.21 - 0.297mm	6% weight
0.15 - 0.21mm	4% weight
0.105 - 0.15mm	2% weight
0.074-0.105mm	0.5% weight
< 0.074mm	0.5% weight

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Spectrographic Analysis of the glass globules indicated the following major constituents present:

Very strong: Mg, Al, Si, Ca

Strong: Fe, Ti

Medium: Mn

Analysis of the scales of green paint similar to the one associated with the glass:

Strong: Fe, Mg, Si, Ca, Ti, Zn

Medium: Cr

Discussion: The association of the glass globules with scaled-off paint is clearly inconsistent with the assumption that the glass is part of the fall-out. Particle shapes, chemical composition, uniformity of physical properties and size distribution are also different from what one would expect of beads formed while air-borne. Glass beads formed in this fashion were found at the Trinity Site but only within a couple hundred feet from the tower site. They deviated little from spherical shape, the refractive index of glass was variable even within single beads, the interior of which exhibited flow structures.

It is considered likely that the glass beads in this sample owe their origin to a welding, brazing or some similar operation performed on the vehicle in which they were found.

E. Staritzky
Analyst

/s/ C. F. Metz
Group Leader

8/30/51
Date

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